

Volume Explorations

Complete the table.

The dimensions of each prism should be listed so that the longest dimension is the length and the shortest dimension is the height.

Prism	Length (cm)	Width (cm)	Height (cm)	What is the scale factor applied to Prism A to create this prism?	How many Prism As would it take to fill this prism?	Volume (cm ³)	Ratio of volumes: $\frac{\text{Volume of this prism}}{\text{Volume of Prism A}}$	Ratio of volumes: $\frac{\text{Volume of Prism A}}{\text{Volume of this prism}}$
A								
B								
C								
D								

What is the relationship between the "Scale factor..." column and the "How many Prism As..." column?

If a scale factor of 10 was applied to the dimensions of Prism B, what would be the volume of the new prism?

How will the volume of a three-dimensional figure be affected when a scale factor of 5 is applied to create a new three-dimensional figure?





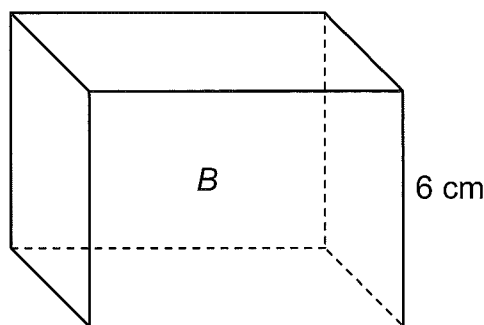
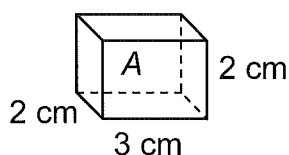
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Independent Practice

When a scale factor is applied to the dimensions of a three-dimensional figure, the volume of the new figure increases by the cube of the scale factor (scale factor)³.

Example:

Figure *B* is similar to figure *A*.



What is the volume of figure *B*?

The volume of figure *A* can be found by using the formula $V = Bh$ to get an answer of 12 cm^3 .

A scale factor of 3 was applied to figure *A* to create figure *B*. This means that the volume of figure *B* will be 3^3 , or 27, times the volume of figure *A*.

$12(27) = 324$, so the volume of figure *B* will be 324 cm^3 .

You can check your answer by finding the missing dimensions of figure *B* by applying the scale factor to the dimensions of figure *A*. You can then verify the volume of figure *B*.

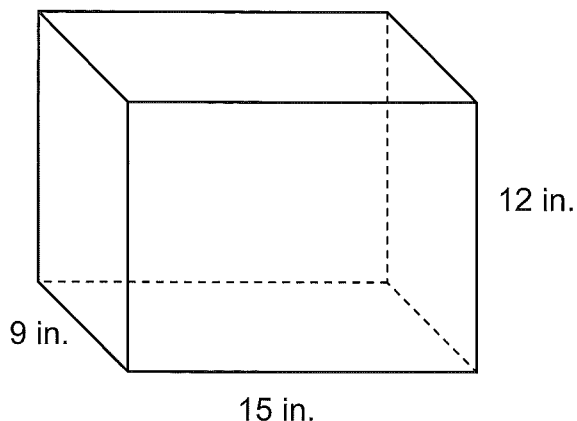
The missing dimensions of figure *B* can be found by multiplying the length and width of figure *A* by the scale factor, 3. The missing dimensions are 6 cm and 9 cm.

Finally, find the volume of figure *B* by multiplying $6 \text{ cm} \times 6 \text{ cm} \times 9 \text{ cm} = 324 \text{ cm}^3$. The original answer has been verified.

1 If a scale factor of $\frac{1}{2}$ is applied to the dimensions a prism whose volume is 120 cubic centimeters, what will be the volume of the new prism?

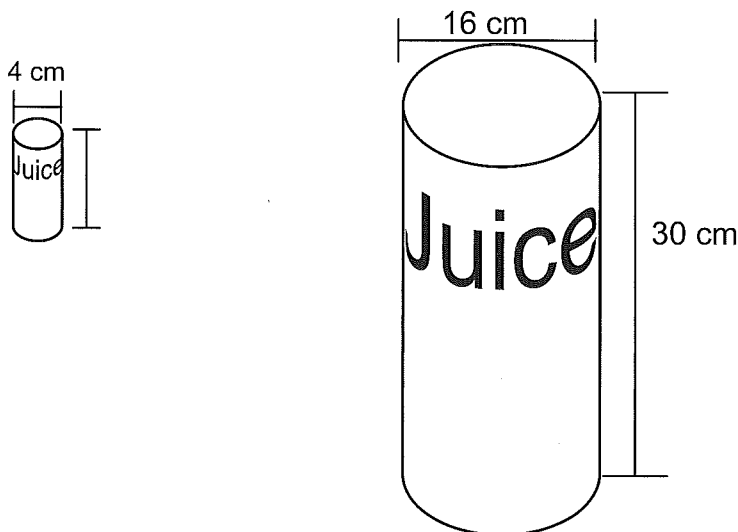


- 2 A moving company sells different-sized cartons. The largest carton is shown below.



If the smallest carton is similar to the largest carton and has a volume of 60 in.^3 , what are the dimensions of the smallest carton?

- 3 Two similar cans of juice are shown below.



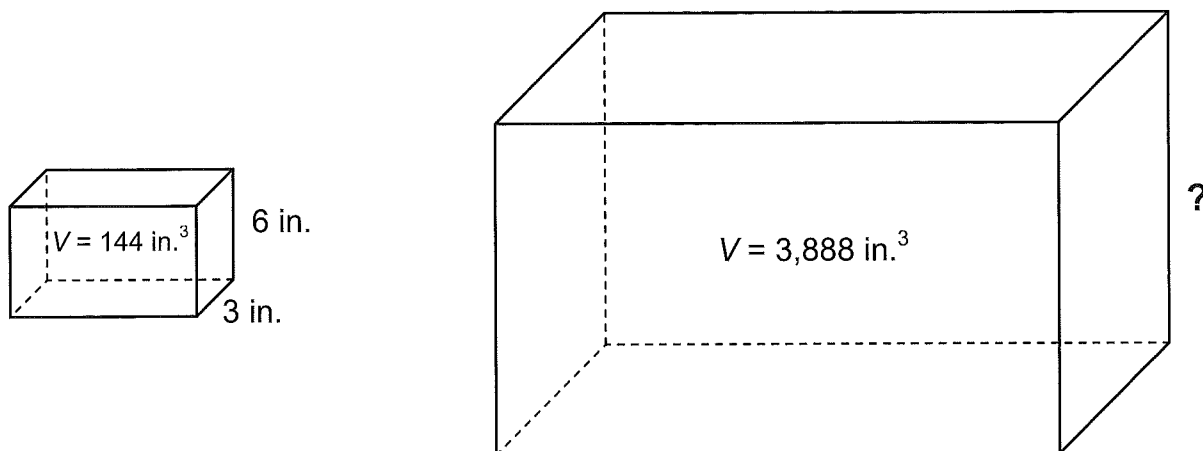
What is the volume of the small can of juice?

- 4 A toy company plans on making giant foam building cubes. The dimensions of each giant building cube will be 6 times the dimensions of the current cube. If the current cube has side lengths of 2 inches, what will be the volume of 1 large foam building cube?



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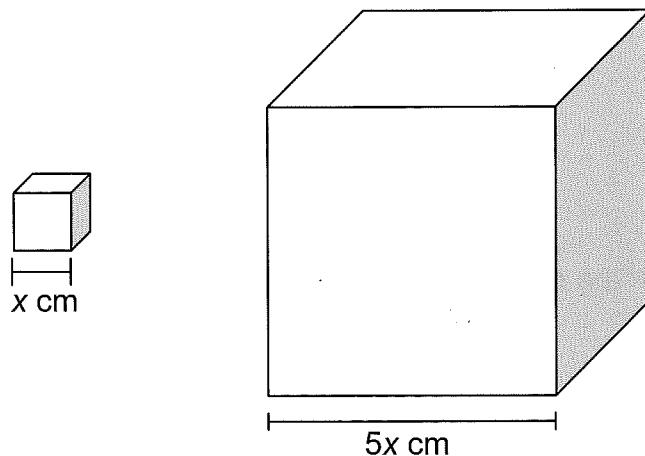
- 5 James made the similar prisms shown below.



What is the height of the larger prism?

- 6 Aaron is making similar cylinders to be used during the school play. The largest cylinder will be created by applying a scale factor of 8 to the dimensions of the smaller cylinder. How will applying this scale factor affect the volume of the largest cylinder?

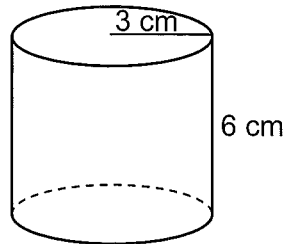
- 7 The dimensions of two cubes are shown below.



The volume of the smaller cube is 27 cubic centimeters. What is the volume of the larger cube?

Selena's Cylinders

Selena has been asked to create 2 cylinders that are similar to the cylinder shown below.



She applied a scale factor of $\frac{1}{3}$ to create a smaller cylinder and a scale factor of 2 to create a larger cylinder. What were the volumes of the 2 cylinders that Selena created? Justify your answer.

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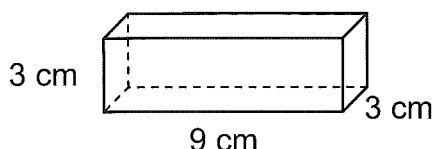
a. YES NO Student arrives at a correct solution?

	4	3	2	1
b. Conceptual Knowledge				
c. Procedural Knowledge				
d. Communication				



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- 1 If a scale factor of $\frac{1}{3}$ is applied to the prism shown below, what will be the volume of the new prism?



- A 54 cm^3
B 18 cm^3
C 6 cm^3
D 3 cm^3
- 2 How will the volume of a three-dimensional figure be affected when a scale factor of 4 is applied to create a new three-dimensional figure?
- A The volume of the new figure will be 64 times the volume of the original figure.
B The volume of the new figure will be 16 times the volume of the original figure.
C The volume of the new figure will be 8 times the volume of the original figure.
D The volume of the new figure will be 4 times the volume of the original figure.

- 3 A candy company makes candy bars in the shape of rectangular prisms that have a volume of 10 cubic centimeters. The company decides to make a larger candy bar by applying a scale factor of 2 to each of the dimensions of the original candy bar. What will be the volume of the new candy bar?

- A 20 cm^3
B 60 cm^3
C 80 cm^3
D 100 cm^3

- 4 The dimensions of a large rectangular prism are 4 times the dimensions of a small rectangular prism. If the large rectangular prism has a volume of $3,840 \text{ cm}^3$, what is the volume of the small rectangular prism?

- A $245,760 \text{ cm}^3$
B 960 cm^3
C 240 cm^3
D 60 cm^3